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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.								
09/621,119	07/21/2000	David J. Gesbert	P113US1	4420								
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<table border="1"><tr><td colspan="2">EXAMINER</td></tr><tr><td colspan="2">VARTANIAN, HARRY</td></tr><tr><td>ART UNIT</td><td>PAPER NUMBER</td></tr><tr><td>2634</td><td></td></tr></table>					EXAMINER		VARTANIAN, HARRY		ART UNIT	PAPER NUMBER	2634	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/621,119	GESBERT ET AL.
	Examiner	Art Unit
	Harry Vartanian	2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 21 July 2000.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-31 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) 19-22 is/are allowed.
 6) Claim(s) 1-3,5,7,8,10-15,17,23,25,27 and 29-31 is/are rejected.
 7) Claim(s) 4,6,9,16,18,24,26 and 28 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 21 July 2000 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>5, 6</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____.

Art Unit: 2634

Detailed Action

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 605, 610, 615, 620, 630, 635, 705, 710, 715, 720, 730, 735, 920. Corrected drawing sheets, or amendment to the specification to add the reference character(s) in the description, are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to because ***the margins in fig 1 do not show item 140.*** Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled

Art Unit: 2634

"Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-3, 5, 7-8, 10-15, 17, 23, 25, 27, 29-31 are rejected under 35 U.S.C. 103(a) as being anticipated by Raleigh et al(US Patent# 6144711) in view of Eidson(US Pat 6,411,824). Regarding Claim 1, Raleigh et al meets the following limitations of the Claim:

a plurality of transceiver antennae, each transceiver spatially separate from at least one other transceiver antenna, each transceiver antenna further comprising a transceiver antenna polarization, **figs 11 and 12**

at least one transceiver antenna having a polarization that is different than at least one other transceiver antenna, each transceiver antenna transmitting a corresponding data stream; **Abstract; (column 11, lines 14-41)**

Art Unit: 2634

a plurality of receiver antennae, the receiver antennae receiving at least one data stream; **fig 12**

Raleigh et al fails to teach specifically the adjustment of antenna polarization to optimize separability of received data streams. Raleigh et al does teach spatial orthogonalization(see Column 16, Line 59 to Column 17, Line 36), but does not get specific about antennas.

However, Eidson does meet the following limitation of the Claim:

the transceiver antenna polarization of each transceiver antenna is pre-set to optimize separability of the received data streams. (**Column 5, Line 49 to Column 6, line 22**)

Therefor it would have been *prima facie* obvious for Raleigh et al to adjust his antenna polarization in order to maintain spatial orthogonalization at the receiver. The motivation to combine is disclosed by Raleigh in column 1, lines 31-59 wherein he states that

"Adaptive array processing is known to improve bit error rate, data rate, or spectral efficiency in a wireless communication system."

Regarding Claim 2, Eidson meets the following limitations of the Claim:

wherein the pre-set transceiver antenna polarization of each transceiver antenna is determined experimentally. (**Column 5, Line 49 to Column 6, line 22**)

Regarding Claim 3, Eidson meets the following limitations of the Claim:

wherein the pre-set transceiver antenna polarization of each transceiver antenna is experimentally determined by characterizing the separability of received data streams. (**Column 15, lines 7-20**)

Regarding Claim 5, Raleigh et al meets the following limitations of the Claim:

wherein each receiver antenna is spatially separate from at least one other receiver antenna, each receiver antenna further comprising a receiver antenna polarization, at least one receiver antenna having a polarization that is different than at least one other receiver antenna. **Abstract**

Regarding Claim 7, Raleigh et al meets the following limitations of the Claim:

wherein the receiver antenna polarization of each receiver antenna is pre-set to optimize separability of the received data streams. **Abstract**

Regarding Claim 8, Raleigh et al meets the following limitations of the Claim:

Art Unit: 2634

wherein the pre-set receiver antenna polarization of each receiver antenna is determined experimentally. **(Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Regarding Claim 10, Eidson meets the following limitations of the Claim:

the transceiver antenna polarization of each transceiver antenna is pre-set to minimize correlation between the data streams. **(Column 5, Line 49 to Column 6, line 22)**

Regarding Claim 11, Eidson meets the following limitations of the Claim:

wherein the pre-set transceiver antenna polarization of each transceiver antenna is determined experimentally **(Column 5, Line 49 to Column 6, line 22)**

Regarding Claim 12, Raleigh et al meets the following limitations of the Claim:

wherein a transmission channel between the transceiver antennae and the receiver antennae is estimated with a channel matrix, and wherein the pre-set transceiver antenna polarization of each transceiver antenna is experimentally determined by minimizing a correlation coefficient of the channel matrix. **Abstract; (Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Regarding Claim 13, Raleigh et al meets the following limitations of the Claim:

wherein the receiver antenna polarization of each receiver antenna is pre-set to minimize correlation between the data streams. **Abstract**

Regarding Claim 14, Raleigh et al meets the following limitations of the Claim:

wherein the pre-set receiver antenna polarization of each receiver antenna is determined experimentally. **Abstract; (Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Regarding Claim 15, Raleigh et al meets the following limitations of the Claim:

wherein a transmission channel between the transceiver antennae and the receiver antennae is estimated with a channel matrix, and wherein the pre-set receiver antenna polarization of each receiver antenna is experimentally determined by minimizing a correlation coefficient of the channel matrix. **Abstract; (Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Regarding Claim 17, the rejection of Claim 1 above also applies here. Taking into account channel conditions or "parameters" is met by Eidson in column 17, lines 1-15.

Regarding Claim 23, the rejection of Claim 1 above also applies here.

Regarding Claim 25, Raleigh et al meets the following limitations of the Claim:

Art Unit: 2634

wherein each receiver antenna is spatially separate from at least one other receiver antenna, each receiver antenna further comprising a receiver antenna polarization, at least one receiver antenna having a polarization that is different than at least one other receiver antenna. **Abstract**

Regarding Claim 27, Raleigh et al meets the following limitations of the Claim:

further comprising means for setting the receiver antenna polarization of each receiver antenna to optimize separability of the received data streams. **Abstract; (Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Regarding Claim 29, Raleigh et al meets the following limitations of the Claim:

further comprising means for setting the receiver antenna polarization of each receiver antenna to optimize de-correlation of the received data streams. **Abstract; (Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Regarding Claim 30, Raleigh et al meets the following limitations of the Claim:

wherein a transmission channel between the transceiver antennae and the receiver antennae is estimated with a channel matrix, and wherein the means for setting the receiver antenna polarization of each receiver antenna comprises minimizing a correlation coefficient of the channel matrix. **Abstract; (Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Regarding Claim 31, Raleigh et al meets the following limitations of the Claim:

wherein the pre-set transceiver antenna polarization of each transceiver antenna is determined experimentally. **Abstract; (Column 16, Line 59 to Column 17, Line 36); (Column 18, Lines 46-55)**

Allowable Subject Matter

4. Claims 4, 6, 9, 16, 18, 24, 26, 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Claims 19-22 are allowed. Prior art failed to teach the adjustment of antenna **polarization** by "minimizing a singular value spread of the channel matrix". It did teach changing the spatio-orthogonality of a multi antenna transceiver using SVD in Raleigh et al.

Art Unit: 2634

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 703.305.8698. The examiner can normally be reached on 10:00-6:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703.305.4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry Vartanian
Examiner
Art Unit 2634

HV



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